ABSTRACT:

Oil spill or leakage into waterways and ocean spreads very rapidly due to the action of wind and currents. The study of the behavior and movement of these oil spills in sea had become imperative in describing a suitable management plan for mitigating the adverse impacts arising from such accidents. But the inherent difficulty of discriminating between oil spills and look- alikes is a main challenge with Synthetic Aperture Radar (SAR) satellite data and this is a drawback, which makes it difficult to develop a fully automated algorithm for detection of oil spill. As such, an automatic algorithm with a reliable confidence estimator of oil spill would be highly desirable. The main objective of this work is to develop comparative automatic detection procedures for oil spill pixels in multimode (Standard beam S2, Wide beam W1 and fine beam F1) RADARSAT-1 SAR satellite data that were acquired in the Malacca Straits using two algorithms namely, post supervised classification, and neural network (NN) for oil spill detection. The results show that NN is the best indicator for oil spill detection as it can discriminate oil spill from its surrounding such as look-alikes, sea surface and land. The receiver operator characteristic (ROC) is used to determine the accuracy of oil spill detection from RADARSAT-1 SAR data. The results show that oil spills, lookalikes,and sea surface roughness are perfectly discriminated with an area difference of 20% for oil spill, 35% look–alikes, 15% land and 30% for the sea roughness. The NN shows higher performance in automatic detection of oil spill in RADARSAT-1 SAR data as compared to Mahalanobis classification with standard deviation of 0.12. It can therefore be concluded that NN algorithm is an appropriate algorithm for oil spill automatic detection and W1 beam mode is appropriate for oil spill and look-alikes discrimination and detection.